

BRITISH STANDARD 1991 : Part 1 : 1954

Incorporating amendment issued July, 1955

LETTER SYMBOLS, SIGNS AND ABBREVIATIONS

PART 1. GENERAL



BRITISH STANDARDS INSTITUTION

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LETTER SYMBOLS, SIGNS
AND ABBREVIATIONS

PART 1. GENERAL

B.S. 1991 : Part 1 : 1954

Price 6/- net

BRITISH STANDARDS INSTITUTION

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In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 2000, indexed and cross-indexed for reference, together with an abstract of each standard, will be found in the Institution's Yearbook, price 12s. 6d.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

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CO-OPERATING ORGANIZATIONS

The Units and Symbols Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations :—

- *Association of Principals of Technical Institutions
- British Cotton Industry Research Association
- British Electrical and Allied Industries Research Association
- *British Electrical and Allied Manufacturers Association
- British Electricity Authority
- British Internal Combustion Engine Research Association
- British Iron and Steel Federation
- *Gas Council
- Imperial Chemical Industries Ltd.
- Institute of Fuel
- *Institute of Metals
- *Institute of Petroleum
- *Institute of Physics
- Institution of Refrigeration
- Institution of Civil Engineers
- *Institution of Electrical Engineers
- *Institution of Gas Engineers
- *Institution of Heating and Ventilating Engineers
- *Institution of Mechanical Engineers
- *London Mathematical Society
- *National Physical Laboratory
- *Physical Society
- *Royal Aeronautical Society
- *Royal Institute of British Architects
- *Royal Institute of Chemistry
- *Royal Society
- *Society of Chemical Industry
- Water-tube Boilermakers' Association
- World Power Conference (British National Committee)

The scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this standard :—

Admiralty
Biochemical Society
British Federation of Master Printers
Central Radio Bureau, Electronic Glossary and Symbols Panel
Chemical Society
The Faraday Society
Institute of Biology
Institution of Chemical Engineers
Institution of Naval Architects
Institution of Water Engineers
Iron and Steel Institute
Society of Glass Technology

The B.S.I. gratefully acknowledges the assistance rendered by editors and representatives of scientific and technical publications, whose co-operation in the work of the committee proved to be of the greatest value.

BRITISH STANDARD

LETTER SYMBOLS, SIGNS AND ABBREVIATIONS

Part 1. General

FOREWORD

The need to revise B.S. 560 : 1934, 'Engineering symbols and abbreviations', and B.S. 813 : 1938, 'Chemical symbols and abbreviations', made clear the desirability of combining these two

PD 2707

Amendment No. 2, published 8 February, 1957

to B.S. 1991 : Part 1 : 1954

Letter symbols, signs and abbreviations

Addendum

<i>Page 31.</i>	<i>Term</i>	<i>Abbreviation</i>
	decibel	dB

Insert an asterisk against the word decibel, and a corresponding footnote as follows :—

‘*The abbreviation db is generally used in telecommunications.’

The general principles and the individual symbols recommended in B.S. 813 were based on the Report of a Joint Committee of the Chemical Society, the Faraday Society and the Physical Society—the CFP Report—which was issued in 1937 and took account of the recommendations in earlier reports, such as those of International Conferences on Physics and of the American Standards Association. The CFP Report, representing a substantial measure of agreement between British physicists and chemists, was adopted with minor modifications by the Royal Society, which set up a standing committee, on which the Chemical Society, the Faraday Society and the Physical Society are represented (R. S. Symbols Committee), to consider from time to time any directions in which the CFP Report should be revised. At subsequent meetings of the relevant Commissions of the International Union of Pure and Applied Chemistry (IUPAC Reports 1947 and 1949) and of the International Union of Pure and Applied

Physics (IUPAP Report 1948), symbols for quantities used by chemists and physicists were considered at international level. Due regard was paid to earlier reports by these two Commissions and to those by various national bodies, including the modified CFP Report. From IUPAC Report 1949, it is clear that practically complete agreement has now been reached between chemists and physicists over a very wide range. It is recognized, however, that, owing to differences of language, international agreement on abbreviations for words is not to be expected and, even as regards symbols for quantities, alternatives must be admitted more frequently than is necessary in any one group of countries with a common language. The R.S. Symbols Committee, in its recent consideration of the revision of the CFP Report, has had this feature of international recommendations in mind. In modifying the CFP Report due account has been taken of the latest proposals of the IUPAC and IUPAP Commissions but a selection of alternative symbols has been made and certain extensions of general recommendations introduced in order to provide a self-consistent scheme which, while not conflicting with international proposals, should serve to meet the requirements of British practice. The general conclusions of the R.S. Symbols Committee on these matters, now embodied in its published Report (RCFP Report, 1951), were available in advance to the B.S.I. committee concerned with the revision of these British Standards.

In the preparation of B.S. 560 attention had also been given to the then available reports of relevant national and international bodies, especially to those of the International Electrotechnical Commission in respect of symbols for quantities used in electrical engineering, as well as to current practice in the publications of the principal engineering institutions. In the present revision account has been taken of the latest reports of these bodies, including those referring to current usages of engineering symbols in the United States and other countries.

B.S. 560 covered a wider range of symbols and abbreviations, however, than could conveniently be brought within the scope of the present British Standard, for it extended into such specialized fields as 'locomotive classification', 'naval architecture' and 'hydraulics and water engineering' and included abbreviations and conventional signs used in drawings, which are largely peculiar to those fields of work. It was decided that, in the first instance, attention should be focused on symbols for the more fundamental quantities which are of common concern to all branches of pure and applied science, on conventions relating to their use and on abbreviations for relevant words, especially the names of units. It has been taken for granted that the latter should include those accepted by the Ninth General Conference of Weights and Measures, 1948. Agreement among physicists, chemists and engineers in this field will afford a basis for extensions into various specialized branches of technology; without such agreement, the development of a self-consistent scheme of general application cannot be achieved.

In this standard an attempt has therefore been made to co-ordinate and combine only those sections of B.S. 560 and B.S. 813 which come within these categories. It will be for bodies of experts in specialized fields to build in various directions on the foundations thus laid. The results of such work will be published as subsequent Parts of this standard.

It should be noted, however, that the recommendations here made are intended to give guidance towards the development of a general system. **It is more important that the general principles put forward should be accepted and followed than that there should be rigid adherence in all instances to recommendations on the use of individual symbols.** Certain variations in detail may indeed be necessary in specialized fields but there should be no departure from the general principles laid down, especially as regards the consistent use of italic (sloping) type for symbols for physical quantities, whether the letters are capitals or lower case. It is urged, however, that the recommendations on symbols for thermodynamic quantities should be strictly followed, for these quantities are widely used by workers in practically every branch of science and technology, and incomplete agreement on the symbols allocated to them has hitherto been one of the major sources of confusion.

RECOMMENDATIONS

SECTION ONE : GENERAL PRINCIPLES

A. Alphabets and founts

In order to make the best use of the limited number of readily available alphabets and founts, it is recommended that the under-mentioned principles, already generally approved at international level, should be adopted.

A clear distinction is to be drawn between symbols for physical quantities and other symbols and abbreviations.

1. *Symbols for physical quantities* (see schedule B, 1-10). These normally consist of single letters of the Latin or Greek alphabets (sometimes with subscripts or other modifying signs—for examples, see Appendix to schedule B) which are used to represent the quantities concerned, especially in equations showing relationships between them. For a particular quantity the same symbol is to be used irrespective of the units in which it is expressed.

Where letters of the Latin alphabet (capitals or lower case) are used for this purpose, they are to be printed in italic (sloping) type, except that the distinctive bold-face type used for symbols for vector quantities, etc. may be upright (see below).

2. *Other symbols and abbreviations*—including—

(i) those denoting mathematical operations and constants (see schedule A) ;

(ii) symbols for the chemical elements (see schedule C) ;

(iii) abbreviations for words (see schedules D and E), including abbreviations for the names of units (schedule D).

Where letters of the Latin alphabet (capitals or lower case) are used for any of these purposes, they are to be printed in roman (upright) type.

By making this broad distinction between symbols for physical quantities—to be printed in a sloping fount of type—and other symbols and abbreviations—to be printed in an upright fount of type—at least in so far as letters of the Latin alphabet (including capital letters) are concerned, the pressure on certain overworked letters is notably relieved.

A further relief is secured if sloping bold-face type is employed for letters of the Latin or Greek alphabets denoting **general constants** (see schedule B, 1) ; this has the additional advantage of causing these symbols to stand out against those for variables in equations.

Thus, *e* (roman) can be used to denote the base of natural logarithms (a purely mathematical constant—schedule A), and ***e*** (bold italic) to represent the magnitude of the charge of the electron (a physical constant—schedule B, 1), leaving *e* (ordinary italic) for physical quantities (variables) such as ‘ strain ’. Similarly, the use of *d* (roman) to denote the operation of differentiation (schedule A) leaves *d* (ordinary italic) available for physical quantities such as ‘ diameter ’ or ‘ relative

density', but in this particular instance the distinction is not insisted upon because the employment of *d* (ordinary italic) for differentiation is sometimes justified on grounds of convenience and economy.

A distinctive bold-face type, commonly but not necessarily sans serif, should be used for symbols for **vector quantities**. This may be either upright (see p. 16) or sloping, provided only that it is different from the type employed for general constants (see above). The use of ordinary italic letters for the same quantities remains as an alternative and is often adopted when the vector character is not to be emphasized. The use of the same distinctive bold-face type for the **fundamental electromagnetic quantities** specified in schedule B, 5 (pp. 21–22), will sometimes be found convenient, even when the directional character of these quantities is not to be emphasized, in order to relieve the pressure on the same letters (especially *E*, *D* and *S*) required for other quantities. The same bold fount that is adopted for vectors is also usually available, without causing ambiguity, for symbols denoting (i) quantities varying sinusoidally with time, such as can be represented by a rotating vector (e.g. current, voltage, apparent power—see below); (ii) complex quantities representing phase relations (e.g. impedance, admittance, propagation-coefficient, permeability, permittivity).

The employment of bold-face or other special founts for symbols for individual quantities is deprecated. Such a fount should be adopted only for a well-defined group of quantities or a particular application of them, as illustrated above. Whenever such a special fount is adopted, it should be used consistently for all quantities in the prescribed category throughout a particular discussion.

In order to obtain additional flexibility, capital letters may be used as variants for lower case letters, and vice versa, if no ambiguity is likely to arise. For example, instead of d_i and d_e for internal and external diameter, d and D may be written respectively. The normal symbol for length is l and for inductance L , but l and L may also be used for two lengths or two inductances; if length and inductance appear together, however, l should preferably be used only for length and L for inductance, and necessary distinctions within each category made by means of subscripts or otherwise. It is sometimes convenient to be able to use P for total (or external) pressure, leaving p for partial pressures of the components of a system. Whenever such variants of the normal symbol for a quantity are adopted, the significance of the symbols employed should be clearly stated.

These alternative uses of upper and lower case letters are not indicated in the lists of symbols (schedule B) unless some special significance attaches to the selection. Thus, Q and q are both given for 'quantity of heat' and W and w for 'work', because, although the capital letters are generally used, it is sometimes advantageous to employ the corresponding lower case letters in thermodynamic arguments where it is desired to emphasise the difference in character between these quantities and others, such as internal energy and entropy, that are functions of the state of the system and are represented by capital letters.

Nevertheless, even with these provisions for the use of different founts and cases, the number of distinctive letter symbols available for physical quantities is insufficient to enable each such symbol to be allotted to a single quantity, and alternatives are therefore required in some instances. Such alternatives are given in schedule B where a need for them is most likely to arise or, in a few cases, where alternative usages are firmly established and unobjectionable. *Where two or more symbols separated by commas are given for a quantity, these symbols are regarded as alternatives for which no preference is expressed: where two such symbols are separated by a dotted line the former is the first preference.*

Where it is necessary to select from alternative symbols for a quantity, or to adopt a symbol for a quantity not listed, consideration should be given to current practice by authorities in the field and to the desirability that *symbols for quantities constituting a well-defined class should, if possible, belong to the same alphabet, fount and case.* The selected symbols should be such as to permit of modification in accordance with a uniform scheme for the representation of any important series of corresponding derived quantities or of values under special conditions. Thus, in electrical engineering, the use of italic capitals for quantities such as current, voltage and power (see schedule B, 5) to denote 'steady' values (root mean square or direct current values) permits the following modifications, illustrated by current (I):— i for an instantaneous value; $\mathbf{I}$ for a value as a complex quantity (see above).

Abbreviations representing the names of internationally accepted units (see schedule D) may consist of single letters (such as V for volt), or of several letters (such as kWh for kilowatt-hour), and are used *following (or preceding) a number (e.g. 1.236V; pH 5.3) and never as symbols for the corresponding physical quantities in equations.*

A single-letter abbreviation for the name of a unit which is identical with or derived from a personal name should be a capital letter, but some exceptions to this rule have been admitted where misunderstandings might otherwise arise, e.g. c is in general use for curie. It may also be noted that it is sometimes useful to use a smaller size of type for single capital letter abbreviations for the names of units, e.g. a small capital N for 'normal concentration' (which serves to avoid confusion with the chemical symbol for nitrogen).

The use of two distinct founts of Greek letters—one sloping (for symbols for physical quantities) and the other upright (for other purposes, including mathematical operations and constants)—may not be justified as a general practice, but it has been adopted in this standard in order to bring out the distinction between the two applications. Where only one fount is to be adopted, a sloping type is preferred, for the major use of Greek letters is as symbols for physical quantities and it is desirable that the slope of these letters should be similar to that of the italic letters of the Latin alphabet used for these quantities. For the same reason, sloping bold Greek letters are preferred as symbols for general constants whenever the practice of using bold italic letters for this purpose is adopted (see schedule B, 1).

A point of major importance is to correct the tendency of some printers to use upright capital letters and sloping lower case letters of the Latin alphabet for symbols for physical quantities—unless instructed otherwise. Not only does this practice result in an untidy appearance of a page of print but it also uses up unwarrantably the upright letters that are required for other purposes, especially as abbreviations for the names of units. It is understood that printers who retain this 'house rule' are always prepared to depart from it on request, and appropriate instructions should be given wherever necessary.

It should be noted that certain founts of type (including 'Times Roman', in which this British Standard is printed) have a pointed form of lower-case italic 'v' (vee). Where confusion with the Greek 'ν' (nu) may arise it is desirable to select a suitable rounded form of lower-case italic 'v' for use as a symbol.

The recommendations in this standard on the use of alphabets and founts relate specifically to printed matter. In written and typewritten documents it is customary to underline letters that are to be in italics and to put a wavy line below letters to be in bold type. Where more than one bold fount is used or where special alphabets or founts are employed, the conventions adopted to indicate them should be clearly stated (see also B.S. 1219, 'Printers' and authors' proof corrections'). It should be noted however that the editors of many periodicals prefer authors of papers to leave to them the insertion of indications to the printer of the type to be used for individual symbols.

B. Other general principles

Mathematical usages. There should be no departure from the standard practice of mathematicians in the use of signs, operator symbols, etc. (see schedule A).

Numbers should be printed in upright figures. A decimal point, not a full point, should be used to separate the whole numbers from the decimals. To facilitate the reading of large numbers the figures may be grouped together in threes with a space (less than a full space) between them. Commas should not be used to separate the groups as this may lead to confusion with the Continental practice of using the comma in place of the decimal point. In mathematical quantities smaller than unity, a cipher should precede the decimal point. For example :

78 293.45	not	78,293.45
0.376 93	not	0.376,93
0.239	not	.239 or .239

There are often several ways of printing any particular mathematical expression, and it is important to choose the one which (i) shows the structure of the expression most clearly, (ii) presents the simplest task to the compositor in setting it up, (iii) disturbs the orderly appearance of the printed page as little as possible. Thus, to comply with (ii), dots, carets or bars above, or similar marks below letters or figures

should be avoided, e.g. $\sqrt{ax + by}$ is preferable to $\sqrt{ax} + by$ and $n!$ to $|n$. To comply with (ii) and (iii), $(ax + b)/(cx + d)$ is preferred to $\frac{ax + b}{cx + d}$. On the other hand, the solidus should be used only sparingly and with discretion in extended expressions and not at all when other characters make abnormal line spacing unavoidable. Ambiguities arising from the use of the solidus (see also p. 13) can generally be removed by means of brackets, e.g. $\log a/b$ might mean either $(\log a)/b$ or $\log (a/b)$ and the brackets are necessary. Again, $e^{2\pi cx/3a}$ is preferable to $e^{\frac{2\pi cx}{3a}}$ while $\exp (2\pi cx/3a)$ is even better, but with more complicated indices the use of this form may violate condition (i). Further examples are given in the London Mathematical Society's pamphlet *Notes on the Preparation of Mathematical Papers*.

For the use of modifying signs such as subscripts, superscripts and brackets (for examples, see Appendix to schedule B), no rigid rules are laid down but a satisfactory notation should fulfil the following requirements:—

- (i) It should not be ambiguous.
- (ii) It should be systematic, simple and easy to remember.
- (iii) It should not be extravagant in using up more letters of the alphabet than necessary.
- (iv) It should not be expensive or difficult to print.

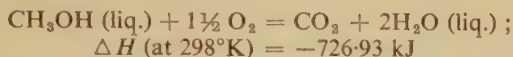
The notation $\ln$ and $\log$ would be preferable to $\log_e$ and $\log_{10}$, respectively, because of condition (iv), were it not for condition (i). The use of $\ln$ and $\log_{10}$ is accepted for the time being in the hope that the use of $\ln$ may become universal, when it will be safe to abbreviate $\log_{10}$ to $\log$.

Brackets (including parentheses, braces and (square) brackets) should not be used around the symbol for a quantity in order to make it represent any other quantity, unless such use is consistently adopted for a whole class of quantities. The use of (square) brackets or braces around a chemical formula to denote, respectively, the molar concentration or the relative activity of the substance fulfils the above general and particular requirements. Most other uses of brackets, apart from their mathematical uses, do not fulfil these requirements.

Second order superscripts or subscripts are to be avoided as far as possible. Thus ex^2 may be printed as $\exp x^2$ (see above). Also $\Delta_{\text{NO}_3^-}$ may be shown as $\Delta(\text{NO}_3^-)$ and $\rho_{20^\circ\text{C}}$ as $\rho(20^\circ\text{C})$. Again, $W_{\text{I},T}$ may be rendered as $W_{\text{I},T}$ or $(W_{\text{I}})_T$.

Conventions for the representation of thermodynamic data for chemical reactions. It is recommended that the thermodynamic data for chemical reactions be expressed by quoting the equation for the reaction (with such specification of the physical states of participating substances as may be necessary) followed by the magnitude of the change (positive or negative) in the appropriate

thermodynamic function. For example : for the heat of reaction at a constant pressure of 1 atm :—



Similarly, for the heat of the same reaction at constant volume—
 $\Delta U \text{ (at } 298^\circ\text{K)} = -728.18 \text{ kJ}$

It is preferred that quantities of heat, as of other forms of energy, be expressed in joules ; where data are given in calories the corresponding values in joules should be added, with the conversion factor used. The use of a special symbol to denote the heat *evolved* in a chemical reaction—as was formerly customary in thermochemistry—is not recommended.

Conventions concerning abbreviations. Abbreviations for the names of units are the same in the singular and the plural.

It is recommended that the full point be not used after any single-word abbreviation for the name of a unit (whether an internationally accepted unit or a British unit—see schedule D) unless its omission is likely to cause ambiguity. Thus, the full point may be necessary in the abbreviations l. (for litre) and in. (for inch) but can be omitted from ml and in² as ambiguity no longer arises.

The solidus, /, may be used in abbreviations for derived units, but it should be noted that it denotes 'divided by' and is not always applicable where the word 'per' is used in the common name of the unit. The following examples illustrate this point :—

foot per second : ft/s

foot per second per second : ft/s² *not* ft/s/s

joule per centimetre per second per degree :

J/cm s deg *or* J cm⁻¹ s⁻¹ deg⁻¹ *not* J/cm/s/deg.

The use of abbreviations containing the letter 'p' denoting 'per' (e.g. r.p.m., m.p.h.) is still common but the adoption of alternatives (e.g. rev/min, mile/h) is to be encouraged.

Where it is desired to stress the distinction between the kilogramme or the pound as a unit of force and a unit of mass, the abbreviation for the former may be written with a capital initial (Kg, Lb) and that for the latter with a lower case initial (kg, lb), in accordance with the Stroud system. If this system is followed the abbreviation for 'foot-pound' is necessarily ft Lb.

In abbreviations for words (Schedule E), including the names of units (Schedule D), only lower case letters should normally be used (as in e.m.f., u.v., h.p.), except to represent the initial letter of a proper name that customarily begins with a capital letter (as in B.t.u., see also p. 10). In some circumstances, however, as in a heading or at the beginning of a sentence, lower case may be inappropriate and capitals should then be used consistently throughout, e.g. E.M.F., not F.m.f.

SECTION TWO : SPECIFIC USAGES

SCHEDULE A. SIGNS, SYMBOLS AND ABBREVIATIONS
DENOTING MATHEMATICAL OPERATIONS AND
CONSTANTS

NOTE. Letters of the Latin alphabet used in this section are to be printed in roman type—except those representing variables, which are to be printed in *italic* type, and except where otherwise specially prescribed.

Where two or more symbols, separated by commas, are given for a quantity, these are alternatives for which no preference is expressed; where two such symbols are separated by a dotted line, the former is the first preference.

Term	Symbol
brackets (Printers describe [] as brackets, { } as braces and () as parentheses)	[{ () }]
plus	+
minus	-
plus or minus	±
difference between <i>a</i> and <i>b</i>	<i>a</i> - <i>b</i>
multiplied by	× or . (lower point)
divided by	÷ or /
equal to	=
approximately equal to	≈
of the order of	~
not equal to	≠
identical with	≡
proportional to	∝
greater than	>
less than	<
equal to or greater than	≥

Term						Symbol
equal to or less than	..	..	..	..	..	$\leq$
much greater than	..	..	..	..	..	$\gg$
much less than	..	..	..	..	..	$\ll$
parallel to	..	..	..	..	..	$\parallel$
perpendicular to	..	..	..	..	..	$\perp$
limit of y	..	..	..	..	..	$\lim y$
approaches a	..	..	..	..	..	$\rightarrow a$
infinity	..	..	..	..	..	∞
sum of	..	..	..	..	..	Σ
product of	..	..	..	..	..	Π
square root of	..	..	..	..	..	$\sqrt{\quad}$
base of natural logarithms	..	..	..	..	..	$e \dots e$
natural logarithm of x	..	..	..	..	..	$\ln x$
common logarithm of x	..	..	..	..	..	$\log x$
antilogarithm	..	..	..	..	..	antilog
exponential function of x	..	..	..	..	..	$\exp x, e^x$
factorial n	..	..	..	..	..	$n !$
ratio of circumference to diameter of circle	..	..	..	..	..	π
trigonometric circular functions of θ	..	..	..	..	..	$\sin \theta; \cos \theta; \tan \theta;$ $\operatorname{cosec} \theta; \sec \theta; \cot \theta$
inverse trigonometric functions of y	..	..	..	..	..	$\sin^{-1} y, \arcsin y;$ etc.
hyperbolic functions of x	..	..	..	..	..	$\sinh x; \cosh x;$ $\tanh x; \operatorname{cosech} x;$ $\operatorname{sech} x; \coth x$
inverse hyperbolic functions of y	..	..	..	..	..	$\sinh^{-1} y, \operatorname{arcsinh} y;$ etc.

Term	Symbol
function of x	$f(x)$, $F(x)$, etc.
increment or finite difference operator ..	Δ , δ
*differential coefficient of y with respect to x ..	$\frac{dy}{dx}$, dy/dx
*differential coefficient, n^{th}	$\frac{d^n y}{dx^n}$, $d^n y/dx^n$
†differential coefficient, partial	$\frac{\partial y}{\partial x}$, $\partial y/\partial x$
operator $\frac{d}{dx}$	D
*integral of y with respect to x :	
indefinite	$\int y \, dx$
from $x = a$ to $x = b$	$\int_a^b y \, dx$
around a closed contour	$\oint y \, dx$
complex operator $\sqrt{(-1)}$ (see also Electricity and Magnetism, schedule B,5)	i , j
real part of ()	$\mathcal{R} ()$, $\text{Re} ()$
imaginary part of ()	$\mathcal{I} ()$, $\text{Im} ()$
modulus of complex number $z \equiv x + iy$..	$ z \equiv x + iy $
argument of complex number z	$\arg z$
vector of magnitude A	$\mathbf{A}$
scalar product of $\mathbf{A}$ and $\mathbf{B}$	$\mathbf{A} \cdot \mathbf{B}$
vector product of $\mathbf{A}$ and $\mathbf{B}$	$\mathbf{A} \times \mathbf{B} \dots \mathbf{A} \wedge \mathbf{B}$
unit vectors of a rectangular co-ordinate system	$\mathbf{i}$, $\mathbf{j}$, $\mathbf{k}$
nabla or del $\left(\mathbf{i} \frac{\partial}{\partial x} + \mathbf{j} \frac{\partial}{\partial y} + \mathbf{k} \frac{\partial}{\partial z} \right)$	∇
Laplacian operator $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2} \right)$	∇^2

* See note on p. 8 concerning use of d for $\mathbf{d}$.

† The practice of a University Press in referring to ∂ as 'dif' is recommended.

Term						Symbol
Bessel functions	..	..	..	..	..	$J, Y, \text{etc.}$
elliptic functions of u	..	..	..	..	..	$\text{sn } u, \text{cn } u, \text{dn } u$
gamma function of n	..	..	..	..	..	$\Gamma(n)$
error function of x	..	..	..	..	..	$\text{erf } x$
Heaviside unit function	..	..	..	..	..	1
i th value of a variate x	..	..	..	..	..	x_i
average of several values of x	..	..	..	..	..	$\bar{x}$
standard deviation of a distributed variate	..	..	..	..	..	σ <i>sigma</i>
number in a sample	..	..	..	..	..	n
correlation coefficient	..	..	..	..	..	ρ <i>rho</i>
range	..	..	..	..	..	w
basic quantities in dimensional equations	..	..	..	..	..	$L, M, T, \text{etc.}$

SCHEDULE B. SYMBOLS FOR PHYSICAL QUANTITIES

NOTE. Letters of the Latin alphabet used as symbols for these quantities are to be printed in *italic* type, except where an upright bold fount is selected for vectors and is specially applied as an alternative for the quantities referred to in the note at the head of schedule B.5.

Where two or more symbols, separated by commas, are given for a quantity, these are alternatives for which no preference is expressed ; where two such symbols are separated by a dotted line, the former is the first preference.

Term						Symbol
1. GENERAL CONSTANTS						
NOTE. Symbols for these constants may be printed in sloping bold (italic or Greek) type to distinguish them from symbols for variables.						
speed of light	..	..	..	..	..	c, c
Avogadro's number	..	..	..	..	..	N, N
gas constant per mole	..	..	..	..	..	R, R
Boltzmann's constant	..	..	..	..	..	k, k
Faraday's constant	..	..	..	..	..	F, F
charge of electron	..	..	..	..	..	$-e, -e$
mass of electron	..	..	..	..	..	m, m
Planck's constant	..	..	..	..	..	h, h
Bohr's magneton	..	..	..	..	..	β, β
Rydberg's constant	..	..	..	..	..	R, R
Stefan-Boltzmann constant	..	..	..	..	..	σ, σ
gravitational constant	..	..	..	..	..	G, G
gravitational acceleration, standard value	..	..	..	..	..	g, g_n
2. MENSURATION						
length	..	..	..	..	..	l
height	..	..	..	..	..	h
breadth	..	..	..	..	..	b
radius	..	..	..	..	..	r

Term							Symbol
diameter	..	..	..	..	..	..	d
angle, plane	..	..	..	..	..	..	$\alpha, \beta; \theta, \phi, \psi, \text{etc.}$
angle, solid	..	..	..	..	..	..	Ω, ω
rectangular co-ordinates	..	..	..	..	..	..	x, y, z
spherical co-ordinates	..	..	..	..	..	..	r, θ, ϕ
cylindrical co-ordinates	..	..	..	..	..	..	$r, \phi, z \dots \rho, \phi, z$
area	..	..	..	..	..	..	$A \dots a$
volume	..	..	..	..	..	..	$V \dots v$
3. KINEMATICS							
time	..	..	..	..	..	..	t
period	..	..	..	..	..	..	T
period of decay or growth	..	..	..	..	..	..	τ
frequency	..	..	..	..	..	..	f, ν
wave number	..	..	..	..	..	..	$\nu \dots \tilde{\nu}$
wavelength	..	..	..	..	..	..	λ
velocity	..	..	..	..	..	..	v, u
angular velocity	..	..	..	..	..	..	ω
acceleration	..	..	..	..	..	..	$a \dots f$
angular acceleration	..	..	..	..	..	..	α
gravitational acceleration	..	..	..	..	..	..	g
4. MECHANICS							
mass	..	..	..	..	..	..	m
density	..	..	..	..	..	..	ρ
density, relative	..	..	..	..	..	..	d
momentum	..	..	..	..	..	..	p
force	..	..	..	..	..	..	F

As altered
June, 1955

Term							Symbol
weight	..	..	..	..	..	..	W
moment	..	..	..	..	..	..	M
pressure	..	..	..	..	..	..	P
work	..	..	..	..	..	..	W, w
energy	..	..	..	..	..	..	E, W
energy, kinetic	..	..	..	..	..	..	T
energy, potential	..	..	..	..	..	..	V
power (see also Electricity and Magnetism)	..						P
efficiency	..	..	..	..	..	..	η
moment of inertia		..	..	..	..		I
radius of gyration		..	..	..	..		k
frequency of rotation (revolutions per unit time)							n
stress, normal	..	..	..	..	..	..	$f \dots \sigma$
stress, shear	..	..	..	..	..	..	$q \dots \tau$
strain, direct	..	..	..	..	..	..	e
strain, shear	..	..	..	..	..	..	ϕ
Young's modulus	..	..	..	..	..	..	E
shear modulus ; rigidity	..	..	..	..	..	..	G
bulk modulus	..	..	..	..	..	..	K
compressibility	..	..	..	..	..	..	κ
Poisson's ratio	..	..	..	..	..	..	$\sigma \dots \nu$
bending moment	..	..	..	..	..	..	M
deflexion	..	..	..	..	..	..	δ
torque	..	..	..	..	..	..	T
angle of twist	..	..	..	..	..	..	θ
distance of extreme fibre from neutral axis	..						y
modulus of section	..	..	..	..	..	..	Z

Term	Symbol
coefficient of friction	μ
viscosity	η
fluidity	ϕ
kinematic viscosity	ν
surface tension	γ, σ
Mach number	M
Reynolds number	R

5. ELECTRICITY AND MAGNETISM

The symbols for the fundamental electromagnetic quantities marked † in this schedule may be printed alternatively in the bold type used for vectors, even when the directional character of these quantities is not to be emphasised. By this means the pressure on the same letters required for other quantities may be relieved. (See p. 9).

electromotive force (see also Electrochemistry) ..	E, V (see p. 10)
potential : potential difference	V
electric current	I (see p. 10)
electric charge	Q
resistance	R
inductance	L
capacitance	C
†electric field strength ; electric force	E
†electric flux density ; electric displacement ..	D
†magnetic flux density ; magnetic induction ..	B
†magnetic field strength ; magnetizing force ..	H
*permittivity, absolute or relative (dielectric constant)	ϵ
*permeability, absolute or relative	μ

*Where it is necessary to distinguish between the absolute and the relative values, the latter may carry the subscript r ; for example $\epsilon_r = \epsilon/\epsilon_0$, the subscript zero denoting the value for free space.

Term						Symbol
†magnetic vector potential	..	..	..	..	..	A
electric flux	..	..	..	..	..	Ψ
magnetic flux	..	..	..	..	..	Φ
current density	..	..	..	..	..	J
†intensity of magnetization ; magnetic polarization	..	..	..	..	..	$M \dots I$
†electric polarization	..	..	..	..	..	P
†Poynting vector	..	..	..	..	..	S
magnetic susceptibility (volume)	..	..	..	..	..	κ
magnetic susceptibility (mass)	..	..	..	..	..	χ
charge density (volume)	..	..	..	..	..	ρ
charge density (surface)	..	..	..	..	..	σ
electronic exit work function	..	..	..	..	..	ϕ
resistivity ; specific resistance	..	..	..	..	..	ρ, r
conductivity ; specific conductance (see also Electrochemistry)	..	..	..	..	..	σ, γ
dipole moment, electric or magnetic	..	..	..	..	..	μ
resistance	..	..	..	..	..	R
reactance	..	..	..	..	..	X
impedance	..	..	..	..	..	Z
conductance	..	..	..	..	..	G
susceptance	..	..	..	..	..	B
admittance	..	..	..	..	..	Y
inductance, self	..	..	..	..	..	L
inductance, mutual	..	..	..	..	..	L_{mn}, M
energy, electrical	..	..	..	..	..	W
power	..	..	..	..	..	P (see p. 10)

† See note at the head of this schedule.

Term	Symbol
power, reactive	Q
power, apparent	S
magnetomotive force	F, M
reluctance	R, S
reluctivity	ν
permeance	Λ
frequency	f
angular frequency	ω
90° operator (see also p. 16)	j
120° operator	h, a
number of turns	N
phase difference	ϕ
power factor (sinusoidal quantities only) ..	$\cos \phi$
dielectric loss angle	δ
Q-factor	Q
propagation coefficient	γ
attenuation coefficient	α
phase-change coefficient	β
phase velocity of electromagnetic waves ..	v

6. LIGHT

luminous flux	F, Φ
luminous intensity	I
luminance ; brightness (photometric)	L, B
luminance factor	β
illumination	E

Term					Symbol
absorption factor	..	..	..	..	α
reflection factor	..	..	..	..	ρ
transmission factor	..	..	..	..	τ
refractive index	..	..	..	..	$n \dots \mu$
7. THERMODYNAMICS					
temperature, empirical	..	..	..	..	$\theta \dots t$
temperature, absolute	..	..	..	..	T
quantity of heat	..	..	..	..	Q, q
internal energy	..	..	..	..	U
entropy	..	..	..	..	S
free energy (Helmholtz function)	..	..	..	..	F
heat function, enthalpy, total heat	..	..	..	..	H
Gibbs' function	..	..	..	..	G
partition function	..	..	..	..	Q
specific heat, heat capacity per unit mass	..	..	..	..	c
heat capacity per mole	..	..	..	..	C
ratio of specific heats	..	..	..	..	γ
coefficient of thermal expansion, linear	..	..	..	..	α
coefficient of thermal expansion, superficial	..	..	..	..	β
coefficient of thermal expansion, cubic	..	..	..	..	γ
thermal conductivity	..	..	..	..	λ, k
Joule-Thomson coefficient	..	..	..	..	μ

Term	Symbol
8. CHEMICAL COMPOSITION AND REACTION	
atomic number	Z
atomic weight	A
molecular weight	M
number of molecules	N
number of moles	n
stoichiometric number of molecules	ν
degree of dissociation	α
mole fraction	x
concentration	c, C
concentration, molar, of substance X	$c_x, C_x, [X]$
molality	m
surface concentration	Γ
velocity constant of reaction	k
activation energy	E
equilibrium constant of reaction	K
diffusion coefficient	D
9. CHEMICAL THERMODYNAMICS	
chemical potential	μ
activity (absolute)	λ
activity (relative)	a
activity (relative) of substance X	$a_x, \{X\}$
activity coefficient (see also Electrochemistry)	f, γ
osmotic pressure	Π
osmotic coefficient	g

Term	Symbol
10. ELECTROCHEMISTRY	
degree of dissociation	α
valency of an ion	z (negative for anion)
ionic strength	I
activity coefficient	f
activity coefficient, stoichiometric	γ
conductivity, specific conductance	κ
conductance, equivalent or (with subscript m) molar	Λ
ionic conductance, equivalent	$\Lambda \dots l$ (with subscript)
transport number	t, T (with subscript)
electromotive force of voltaic cell	E
single electrode potential	E (with subscript)
electrolytic polarization, overpotential	η
electrokinetic potential	ζ

APPENDIX TO SCHEDULE B**SUBSCRIPTS AND OTHER MODIFYING SIGNS (EXAMPLES)****I. SUBSCRIPTS TO SYMBOLS FOR QUANTITIES**

I, II	{ <i>especially with symbols for thermodynamic functions,</i>	{ referring to different systems or different states of a system.
1, 2		
A, B	referring to molecular species A, B, etc.	
i	referring to a typical ionic species i.	
u	referring to an undissociated molecule.	
+, -	referring to a positive or negative ion, or to a positive or negative electrode.	
p, v, T, S	indicating constant pressure, volume, temperature and entropy respectively.	

<i>p, c, a</i>	<i>with symbol for an equilibrium constant</i> , indicating that it is expressed in terms of pressure, concentration, or activity.
<i>G, L, S, X</i>	referring to gas, liquid, solid and crystalline states, respectively.
<i>f, e, s, t, d</i>	referring to fusion, evaporation (vaporization of liquid), sublimation, transition, and dissolution or dilution, respectively.
<i>c</i>	referring to the critical state or indicating a critical value.
<i>o</i>	indicating the value under a specified standard or limiting condition, e.g. equivalent conductance at infinite dilution.
<i>C, D, F</i>	<i>with symbols for optical properties</i> , referring to a particular wavelength.

Where a subscript has to be added to a symbol which already carries a subscript, the two subscripts should be separated by a comma (see also p. 12).

Symbols and signs referred to above as subscripts may also be used as superscripts where no ambiguity arises.

II. OTHER MODIFYING SIGNS

[]	<i>enclosing formula of chemical substance</i> , indicating its molar concentration.
{ }	<i>enclosing formula of chemical substance</i> , indicating its relative activity.

In crystallography it is recommended that :

Millerian indices be enclosed in parentheses, () ;

Laue indices be unenclosed ;

Indices of a plane family be enclosed in braces, { } ;

Indices of a zone axis or line be enclosed in brackets, [] .

Numerals attached to a symbol for a chemical element in various positions have the following meanings :

upper left mass number of atom.

lower left nuclear charge of atom.

lower right number of atoms in molecule.

e.g., ${}^7\text{Li}$; ${}^2_1\text{H}_2$ or D_2 .

By an extension of the convention, the neutron is written as ${}^1_0\text{n}$.

In the formula of a free radical the unshared valency should be indicated by a bold-type point in the middle position, e.g. $\text{H}_3\text{C}^\bullet$; $\text{HO}^\bullet$.

A valency state should be indicated by a superscript Roman numeral following the symbol of the element, e.g. Sn^{II} , Sn^{IV} .

Ionic charge should be indicated by a superscript plus or minus sign following the symbol of the ion ; for multiple charges an Arabic superscript numeral should precede the plus or minus sign ; e.g.

Na^+ , Cl^- , Mg^{2+} , PO_4^{3-} , ${}^7_3\text{Li}^+$

SCHEDULE C. SYMBOLS FOR THE CHEMICAL ELEMENTS

These symbols are to be printed in roman (upright) type

Name	Symbol	Atomic number	Name	Symbol	Atomic number
Actinium	Ac	89	Holmium	Ho	67
Aluminium	Al	13	Hydrogen	H	1
Americium	Am	95	Indium	In	49
Antimony	Sb	51	Iodine	I	53
Argon	A	18	Iridium	Ir	77
Arsenic	As	33	Iron	Fe	26
Astatine	At	85	Krypton	Kr	36
Barium	Ba	56	Lanthanum	La	57
Berkelium	Bk	97	Lead	Pb	82
Beryllium	Be	4	Lithium	Li	3
Bismuth	Bi	83	Lutetium	Lu	71
Boron	B	5	Magnesium	Mg	12
Bromine	Br	35	Manganese	Mn	25
Cadmium	Cd	48	Mercury	Hg	80
Caesium	Cs	55	Molybdenum	Mo	42
Calcium	Ca	20	Neodymium	Nd	60
Californium	Cf	98	Neon	Ne	10
Carbon	C	6	Neptunium	Np	93
Cerium	Ce	58	Nickel	Ni	28
Chlorine	Cl	17	Niobium	Nb	41
Chromium	Cr	24	Nitrogen	N	7
Cobalt	Co	27	Osmium	Os	76
Copper	Cu	29	Oxygen	O	8
Curium	Cm	96	Palladium	Pd	46
Dysprosium	Dy	66	Phosphorus	P	15
Erbium	Er	68	Platinum	Pt	78
Europium	Eu	63	Plutonium	Pu	94
Fluorine	F	9	Polonium	Po	84
Francium	Fr	87	Potassium	K	19
Gadolinium	Gd	64	Praseodymium	Pr	59
Gallium	Ga	31	Promethium	Pm	61
Germanium	Ge	32	Protoactinium	Pa	91
Gold	Au	79	Radium	Ra	88
Hafnium	Hf	72	Radon	Rn	86
Helium	He	2	Rhenium	Re	75

Name	Symbol	Atomic number	Name	Symbol	Atomic number
Rhodium	Rh	45	Thallium	Tl	81
Rubidium	Rb	37	Thorium	Th	90
Ruthenium	Ru	44	Thulium	Tm	69
Samarium	Sm	62	Tin	Sn	50
Scandium	Sc	21	Titanium	Ti	22
Selenium	Se	34	Tungsten	W	74
Silicon	Si	14	Uranium	U	92
Silver	Ag	47	Vanadium	V	23
Sodium	Na	11	Xenon	Xe	54
Strontium	Sr	38	Ytterbium	Yb	70
Sulphur	S	16	Yttrium	Yt	39
Tantalum	Ta	73	Zinc	Zn	30
Technetium	Tc	43	Zirconium	Zr	40
Tellurium	Te	52			
Terbium	Tb	65			

SCHEDULE D. ABBREVIATIONS FOR THE NAMES OF UNITS

Letters of the Latin alphabet used for this purpose are to be printed in roman (upright) type

Abbreviations for the names of units are the same in the singular and the plural.

Where two or more abbreviations, separated by commas, are given for the name of a unit, these are alternatives for which no preference is expressed ; where two such abbreviations are separated by a dotted line, the former is the first preference.

Term							Abbreviation
1. INTERNATIONALLY ACCEPTED UNITS							
For single capital letters the use of a smaller size roman type is admissible (see p. 10)							
metre	..	..	..	..	..	..	m
micron	..	..	..	..	..	..	μ
ångström	..	..	..	..	..	..	Å
degree : minute : second (angle)					..	..	° ' "
radian	..	..	..	..	..	..	rad
square metre	..	..	..	..	..	..	m ² ...sq. m
cubic metre	..	..	..	..	..	..	m ³ ...cu. m
cubic centimetre	..	..	..	..	..	..	cm ³ ...cu. cm ...c.c
litre ..	..	..	..	..	..	..	l. (see p. 13)
millilitre	..	..	..	..	..	..	ml
second (time)	..	..	..	..	..	..	s...sec
minute (time)	..	..	..	..	..	..	min
hour..	..	..	..	..	..	..	h
cycle per second	..	..	..	..	..	..	c/s
revolution per minute	..	..	..	..	..	..	rev/min
gramme	..	..	..	..	..	..	g
kilogramme	..	..	..	..	..	..	kg (see p. 13)

Term							Abbreviation
dyne..	..	..	..	..	..	..	dyn
newton	..	..	..	..	..	..	N
bar ..	..	..	..	..	..	..	b
atmosphere (pressure)	..	..	..	..	..	..	atm
poise	..	..	..	..	..	..	P
stokes	..	..	..	..	..	..	S
decibel	..	..	..	..	..	..	dB
neper	..	..	..	..	..	..	N
joule	..	..	..	..	..	..	J
watt ..	..	..	..	..	..	..	W
watt-hour	..	..	..	..	..	..	Wh
calorie	..	..	..	..	..	..	cal
kilocalorie	..	..	..	..	..	..	kcal
degree Celsius (centigrade)	..	..	..	..	..	..	°C
degree Fahrenheit ..	..	..	..	..	..	..	°F
degree Kelvin	..	..	..	..	..	..	°K
degree Rankine	..	..	..	..	..	..	°R
candela	..	..	..	..	..	..	cd
lumen	..	..	..	..	..	..	lm
lux ..	..	..	..	..	..	..	lx
nit ..	..	..	..	..	..	..	nt
electrostatic unit	..	..	..	..	..	..	e.s.u.
electromagnetic unit	..	..	..	..	..	..	e.m.u.

Term							Abbreviation
coulomb	..	..	..	..	..	..	C
ampere	..	..	..	..	..	..	A, amp
volt	..	..	..	..	..	..	V
ohm	..	..	..	..	..	..	Ω
electron-volt	..	..	..	..	..	..	eV
volt-coulomb	..	..	..	..	..	..	VC
volt-ampere	..	..	..	..	..	..	VA
ampere-turn	..	..	..	..	..	..	AT
farad	..	..	..	..	..	..	F
henry	..	..	..	..	..	..	H
gauss	..	..	..	..	..	..	G
weber	..	..	..	..	..	..	Wb
curie	..	..	..	..	..	..	c
röntgen	..	..	..	..	..	..	r
normal concentration	..	..	..	..	..	..	N (see p. 10)
molar concentration	..	..	..	..	..	..	M (see p. 10)
molal concentration	..	..	..	..	..	..	m
hydrogen ion exponent	..	..	..	..	..	..	pH

PREFIXES TO ABBREVIATIONS FOR THE NAMES OF METRIC UNITS

Indicating multiples

$\times 10^{12}$: tera or megamega	..	..	..		T or MM
$\times 10^9$: giga or kilomega	..	..	..		G or kM
$\times 10^6$: mega	..	..	..	..	M
$\times 10^3$: kilo	..	..	..	..	k

Term						Abbreviation
Indicating sub-multiples						
$\times 10^{-1}$: deci	..	..	..	..	..	d
$\times 10^{-2}$: centi	..	..	..	..	..	c
$\times 10^{-3}$: milli	..	..	..	..	..	m
$\times 10^{-6}$: micro	..	..	..	..	..	μ
$\times 10^{-9}$: nano or millimicro	..	..	..	..	..	n or $m\mu$
$\times 10^{-12}$: pico or micromicro	..	..	..	..	..	p or $\mu\mu$
2. COMMON BRITISH UNITS						
inch ..	..	..	..	..	..	in. (see p. 13)
foot ..	..	..	..	..	..	ft
yard ..	..	..	..	..	..	yd
square inch (similarly for foot, etc.)	..	..	..	..	..	in ² , sq. in.
cubic inch (similarly for foot, etc.)	..	..	..	..	..	in ³ , cu. in.
gallon	..	..	..	..	..	gal
grain	..	..	..	..	..	gr
ounce	..	..	..	..	..	oz
pound	..	..	..	..	..	lb (see p. 13)
hundredweight	..	..	..	..	..	cwt
poundal	..	..	..	..	..	pdl
foot-pound ..	..	..	..	..	..	ft lb (see p. 13)
horse-power	..	..	..	..	..	h.p.
British thermal unit*	..	..	..	..	..	B.t.u.

* Although B.T.U. and B.Th.U. are well established and widely used, the change to lower case 't' and 'u' is to be encouraged to comply with the principle stated in the final paragraph on p. 13.

SCHEDULE E. ABBREVIATIONS FOR WORDS OTHER THAN NAMES OF UNITS (EXAMPLES)

To be printed in roman (upright) type

absolute	..	..	..	..	..	abs.
alternating current			..	..	..	a.c.
anhydrous	..	..	..	..	..	anhyd.
aqueous	..	..	..	..	..	aq.
atmospheric	..	..	..	..	..	atm.
atomic weight	..	..	..	..	..	at. wt.
boiling point	..	..	..	..	..	b.p.
calculated	..	..	..	..	..	calc.
centre of gravity	..	..	..	..	..	c.g.
coefficient	..	..	..	..	..	coeff.
compound	..	..	..	..	..	cpd.
concentrated	..	..	..	..	..	conc.
concentration	..	..	..	..	..	concn.
constant	..	..	..	..	..	const.
corrected	..	..	..	..	..	corr.
critical	..	..	..	..	..	crit.
crystalline, crystallized	..	..	..	..	..	cryst.
current density	..	..	..	..	..	c.d.
decomposition	..	..	..	..	..	decomp.
degree	..	..	..	..	..	deg.
dilute	..	..	..	..	..	dil.
direct current	..	..	..	..	..	d.c.
distilled	..	..	..	..	..	dist.
electromotive force		..	..	..	..	e.m.f.
equation	..	..	..	..	..	eqn.
equivalent	..	..	..	..	..	equiv.
experiment (-al)	..	..	..	..	..	expt.
freezing point	..	..	..	..	..	f.p.
gramme-molecule	..	..	..	..	..	mole
horse-power : brake		..	..	..	..	b.h.p.
effective	..	..	..	..	..	e.h.p.
indicated	..	..	..	..	..	i.h.p.
nominal	..	..	..	..	..	n.h.p.
shaft	..	..	..	..	..	s.h.p.
infra-red	..	..	..	..	..	i.r.
insoluble	..	..	..	..	..	insol.
latent heat	..	..	..	..	..	lat. ht.
liquid	..	..	..	..	..	liq.

magnetomotive force	..	..	..	..	..	m.m.f.
maximum	..	..	..	..	..	max.
melting point ..	..	..	..	..	..	m.p.
minimum	..	..	..	..	..	min.
molecule, molecular	..	..	..	..	..	mol.
molecular weight ..	..	..	..	..	..	mol. wt.
observed	..	..	..	..	..	obs.
potential difference	..	..	..	..	..	p.d.
precipitate (noun)	..	..	..	..	..	ppt.
preparation.. ..	..	..	..	..	..	prep.
recrystallized ..	..	..	..	..	..	recryst.
relative humidity ..	..	..	..	..	..	r.h.
root mean square ..	..	..	..	..	..	r.m.s.
soluble	..	..	..	..	..	sol.
solution	..	..	..	..	..	soln.
specific	..	..	..	..	..	sp.
specific gravity ..	..	..	..	..	..	sp. gr.
specific heat ..	..	..	..	..	..	sp. ht.
specific volume ..	..	..	..	..	..	sp. vol.
standard temperature and pressure	..	..	..	..	..	s.t.p.
temperature	..	..	..	..	..	temp.
ultra-violet	..	..	..	..	..	u.v.
vacuum	..	..	..	..	..	vac.
vapour density ..	..	..	..	..	..	v.d.
vapour pressure ..	..	..	..	..	..	v p.
volume	..	..	..	..	..	vol.
weight	..	..	..	..	..	wt.

APPENDIX

THE GREEK ALPHABET

1	<i>A</i>	α	alpha	13	<i>N</i>	ν	nu
2	<i>B</i>	β	beta	14	<i>E</i>	ξ	xi
3	<i>Γ</i>	γ	gamma	15	<i>O</i>	o	omicron
4	<i>Δ</i>	δ	delta	16	<i>Π</i>	π	pi
5	<i>E</i>	ϵ	epsilon	17	<i>P</i>	ρ	rho
6	<i>Z</i>	ζ	zeta	18	<i>Σ</i>	σ	sigma
7	<i>H</i>	η	eta	19	<i>T</i>	τ	tau
8	<i>Θ</i>	θ	theta	20	<i>Υ</i>	υ	upsilon
9	<i>I</i>	ι	iota	21	<i>Φ</i>	ϕ	phi
10	<i>K</i>	κ	kappa	22	<i>X</i>	χ	chi
11	<i>Λ</i>	λ	lambda	23	<i>Ψ</i>	ψ	psi
12	<i>M</i>	μ	mu	24	<i>Ω</i>	ω	omega

NOTE. The type shown in the above table, and used throughout this standard for symbols for physical quantities, is the sloping fount of 'Porson', except that the lower-case alpha is in the corresponding fount of 'Greek'. By this means the most distinctive forms of letters such as lower-case kappa and phi are provided, while confusion between alpha and italic *a* (in the Latin alphabet) is avoided.

In addition, the following letters from the upright fount of 'Greek' are used to represent mathematical constants and operators and the names of units (see p. 10) :—

lower case epsilon, mu and pi: ϵ, μ, π
 capital gamma, pi, sigma and omega: $\Gamma, \Pi, \Sigma, \Omega$

SECTION THREE : INDEXES

ALPHABETICAL LIST

of recommended symbols for physical quantities, including single letters denoting mathematical constants and operations but not single-letter abbreviations for names of units or other words.

Names of independent quantities are separated by colons; alternative names for a single quantity are separated by semicolons. Enclosure of the name of a quantity in parentheses () indicates that there is an alternative symbol of equal standing; enclosure in square brackets [] indicates that there is another symbol which is preferred. An asterisk against the name of a quantity indicates that the specified symbol is always used with a subscript when denoting that quantity.*

Names shown in bold sloping type refer to general constants which may be represented alternatively by the specified symbols printed in bold italics (see pp. 8, 18). Names shown in bold upright type belong to the fundamental electromagnetic quantities which may be represented alternatively by the specified symbols printed in the distinctive bold type used for vector quantities (see pp. 9, 21).

- A* area : **magnetic vector potential** : atomic weight
a (120° operator)
a [area] : acceleration : activity, relative
- B* **magnetic flux density** ; **magnetic induction** : (brightness ; luminance) : susceptance
b breadth
- C* heat capacity per mole : (concentration) : capacitance
c **speed of light** : specific heat ; heat capacity per unit mass : (concentration)
- D* differential coefficient
D **displacement, electrical** ; **electric flux density** : diffusion coefficient
d differentiation
∂ differentiation, partial
d diameter : density, relative
- E* (energy) : Young's modulus : **electric force** ; **electric field strength** : activation energy : illumination : electromotive force, especially of voltaic cell ; single electrode potential*
e base of natural logarithms
e **charge of electron, magnitude of** : strain, direct
- F* **Faraday's constant** : force : free energy, Helmholtz function : (luminous flux) : (magnetomotive force)
f (frequency) : [acceleration] : stress, normal : (activity coefficient)
- G* **gravitational constant** : shear modulus ; rigidity : Gibbs' function : conductance
g gravitational acceleration : **gravitational acceleration, standard value** : osmotic coefficient

<i>H</i>	magnetic field strength ; magnetizing force ; heat function enthalpy ; total heat
<i>h</i>	(120° operator)
<i>h</i>	<i>Planck's constant</i> : height
<i>I</i>	moment of inertia : [intensity of magnetization ; magnetic polarization] : luminous intensity : electric current : ionic strength
<i>i</i>	(square root of minus one)
<i>J</i>	Bessel function
<i>J</i>	current density
<i>j</i>	(square root of minus one) ; 90° operator
<i>K</i>	bulk modulus : equilibrium constant of chemical reaction
<i>k</i>	<i>Boltzmann's constant</i> : radius of gyration : (thermal conductivity) : velocity constant of chemical reaction
<i>L</i>	(brightness ; luminance) : inductance, especially self-inductance : (inductance, mutual*)
<i>l</i>	length : [equivalent ionic conductance*]
<i>M</i>	moment : bending moment : Mach number : intensity of magnetization ; magnetic polarization : molecular weight : (inductance, mutual) : (magnetomotive force)
<i>m</i>	<i>mass of electron</i> : mass : molality
<i>N</i>	<i>Avogadro's number</i> : number of molecules : number of turns
<i>n</i>	number in a sample : frequency of rotation : number of moles : refractive index
<i>P</i>	power : electric polarization
<i>p</i>	pressure
<i>Q</i>	(quantity of heat) : partition function : electric charge : power, reactive : Q-factor
<i>q</i>	stress, shear : (quantity of heat)
<i>R</i>	<i>gas constant per mole</i> : <i>Rydberg's constant</i> : Reynolds number : resistance : (reluctance)
<i>r</i>	spherical or cylindrical co-ordinate : radius : (resistivity ; specific resistance)
<i>S</i>	<i>Poynting vector</i> : entropy : power, apparent : (reluctance)
<i>T</i>	period : energy, kinetic : torque : temperature, absolute : (transport number*)
<i>t</i>	time : [temperature, empirical] : (transport number*)
<i>U</i>	internal energy
<i>u</i>	(velocity)

V	volume : energy, potential : (electromotive force) : potential : potential difference
v	(volume) : (velocity) : phase velocity of electromagnetic waves
W	(weight) : (energy) : (work) : energy, electrical
w	range of variation : (work)
X	reactance
x	co-ordinate : mole fraction
Y	Bessel function
Y	admittance
y	co-ordinate : distance of extreme fibre from neutral axis
Z	modulus of section : atomic number : impedance
z	co-ordinate ; valency of anion
α	(angle) : angular acceleration : coefficient of thermal expansion, linear : degree of dissociation : light absorption factor : alternation coefficient
β	<i>Bohr's magneton</i> : (angle) : coefficient of thermal expansion, superficial : luminance factor : phase change coefficient
Γ	gamma function
Γ	surface concentration
γ	(surface tension) : ratio of specific heats : coefficient of thermal expansion, cubic : (activity coefficient, especially stoichiometric) : (conductivity, specific conductance) : propagation coefficient
Δ, δ	increment ; finite difference operator
δ	deflexion : dielectric loss angle
ϵ	[base of natural logarithms]
ϵ	permittivity absolute or relative ; dielectric constant
ζ	electrokinetic potential
η	efficiency : viscosity : electrolytic polarization ; overpotential
θ	spherical co-ordinate : (angle) : temperature, empirical
κ	compressibility : magnetic susceptibility, volume : conductivity, specific conductance, especially of electrolytes
Λ	permeance : equivalent conductance : molar conductance* : equivalent ionic conductance*
λ	wavelength : (thermal conductivity) : activity, absolute
μ	coefficient of friction : Joule-Thomson coefficient : chemical potential : [refractive index] : permeability : dipole moment

ν	(frequency) : wave number : [Poisson's ratio] : kinematic viscosity : stoichiometric number of molecules : reluctivity
$\tilde{\nu}$	[wave number]
Π	product of
Π	osmotic pressure
π	ratio of circumference to diameter of a circle
ρ	cylindrical co-ordinate : correlation coefficient : density : light reflexion factor : electric charge density, volume : (resistivity) ; specific resistance)
Σ	sum of
σ	standard deviation of a distributed variate : <i>Stefan-Boltzmann constant</i> : [stress, normal] : Poisson's ratio : (surface tension) : electric charge density, surface : (conductivity, specific conductance)
τ	period of decay or growth : [stress, shear] : light transmission factor
Φ	(luminous flux) : magnetic flux
ϕ	spherical or cylindrical co-ordinate : (angle) : strain, shear : fluidity : electronic exit work function : phase difference
χ	magnetic susceptibility, mass
Ψ	electric flux
ψ	(angle)
Ω	(solid angle)
ω	(solid angle) : angular velocity : angular frequency

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